

# PATENT SPECIFICATION



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450,800

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Complete Specification Accepted: July 24, 1936.

## COMPLETE SPECIFICATION

### Improvements in and relating to Electric Transformers

WE, THE BRITISH THOMSON-HOUSTON COMPANY, LIMITED, a British Company having its registered office at Crown House, Aldwych, London, W.C.2, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement—

- 10 Our invention relates to bushings for electric transformer casings. Metal casings for transformers, particularly of the distribution type, are often provided with overhanging pockets in the side walls, the leads from the transformer windings being brought out of the casings through the insulating bushings extending through these pockets and with the outer ends of the bushings extending downwardly from the pockets and adjacent the side walls of the casings. The general object of the invention is to provide an improved construction and arrangement of bushings of this type which shall be compact and mechanically well protected from breakage and which will offer effective protection to the transformer from excessive voltages on circuits connected thereto through the bushings.
- 20 The invention consists in an electric transformer casing having an overhanging side pocket, an insulating bushing comprising a tubular portion of insulating material secured in said pocket with its lower end directed downwardly therefrom, a terminal for a transformer winding secured in the lower end of the bushing with a part projecting downwardly therefrom, a flange projecting downwardly from the lower end of the bushing between the projecting portion of the terminal and the adjacent wall of the transformer casing and means for detachably securing an external conductor to said projecting portion of the terminal.

A further feature of the invention consists in providing an opening in the side of the flange remote from the transformer casing and securing an electrode to the terminal, said electrode extending through the opening in the flange with its end spaced from the outer part of the pocket to provide a discharge gap.

The invention will be better understood from the following description taken in

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connection with the accompanying drawing in which Fig. 1 is a side view of a metal-encased transformer with a bushing arranged in accordance with the invention, part of the transformer casing being broken away to show details; Fig. 2 is an enlarged section view of the bushing with a small adjacent section of the transformer casing; and Fig. 3 is a view of the outer end of the bushing.

Like reference characters indicate similar parts in the different figures of the drawing.

The transformer 10 shown in the drawing is immersed in an insulating liquid 11 in a metal casing 12 having an outwardly projecting side pocket 13. An insulating bushing 14, which may be formed of porcelain, is secured through an opening in the bottom of the pocket 13 by a clamp 15, a gasket 16 being provided to seal the joint between the edge of the opening in the pocket 13 and a shoulder on the bushing 14. The upper end of the bushing 14 is curved inwardly through the pocket 13 and into the interior of the casing 12. A lead 17 from a winding of the transformer 10 extends through the bushing to an outside terminal 18 sealed through the outer end of the bushing and provided with a clamp 19 to permit a conductor 20 of an external circuit to be secured to the terminal.

The metal casing 12 may be and usually is at ground potential and the terminal 18, which is often at rather a high potential, must be sufficiently spaced from the casing to prevent an arc between these two parts. It is desirable, however, that the outer end of the bushing 14 and terminal 18 be as close as possible to the adjacent side wall of the casing 12 in order to require no unnecessary floor space and also to be mechanically protected as much as possible by the overhanging pocket 13. To secure these advantages the outer end of the bushing 14 is provided with an integral flange or wall 21 projecting between the terminal 18 and an adjacent side wall of the casing 12. This flange increases considerably the breakdown distance between the terminal and the casing and permits the terminal 18, and therefore the outer end of the bushing to be positioned close to the casing and under

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the pocket 13 so as to require minimum floor space and secure maximum mechanical protection from the overhanging pocket.

- 5 A metal electrode 22 is secured to the terminal 18 and projects away from the casing 12 through an opening 23 in the side of the flange 21 opposite the casing. The outer end of the electrode 22 may be curved upwardly toward the adjacent outer portion of the pocket 13. The external lead 20 may also pass from the terminal 18 through the opening 23 in the flange 21.
- 10 The outer end of the bushing 14 with the terminal 18 projects below the level of the insulating liquid in the casing 12 and if an arc should occur between the terminal 18 and the adjacent side wall of the casing 12 a hole might be burned in the casing wall with serious results. Considerable liquid would escape and this liquid is usually highly inflammable and especially so when at the operating temperature of the transformer. The arc very probably would ignite the escaping liquid and a serious fire would result. The outer end of the electrode 22 should consequently be spaced sufficiently near the outer part of the pocket 13 to provide a preferential breakdown path for any arc due to excessive voltage of the terminal 18 such as might result from lightning or other surge reaching the terminal by way of the external circuit conductor 20.
- 35 The outer portion of the pocket 13 is above the level of the liquid in the casing 12 so that if a hole is burned in the pocket 13 by an arc, no liquid can escape. It is desirable of course that the voltage necessary to start an arc between the electrode 22 and the pocket 13 be less than that which might cause damage to the transformer 10 and its windings so that the transformer is protected from electrical

disturbances in the external circuit to which it is connected.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. An electric transformer casing having an overhanging side pocket, an insulating bushing comprising a tubular portion of insulating material secured in said pocket with its lower end directed downwardly therefrom, a terminal for a transformer winding secured in the lower end of the bushing with a part projecting downwardly therefrom, a flange projecting downwardly from the lower end of the bushing between the projecting portion of the terminal and the adjacent wall of the transformer casing and means for detachably securing an external conductor to said projecting portion of the terminal.

2. An insulating bushing according to Claim 1 in which the flange is provided with an opening in its side remote from the transformer casing and an electrode is secured to the terminal said electrode extending through the opening in the flange with its end spaced from the outer part of the pocket to provide a discharge gap.

3. An electric transformer casing provided with a bushing according to Claim 2 and containing an insulating liquid with its level between that of the terminal and that of the outer part of the pocket.

4. An electric transformer casing provided with an insulating bushing substantially as hereinbefore described with reference to the accompanying drawings.

Dated this 30th day of October, 1935.

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450,800 COMPLETE SPECIFICATION

1 SHEET

[This Drawing is a reproduction of the Original on a reduced scale.]

FIG. 1

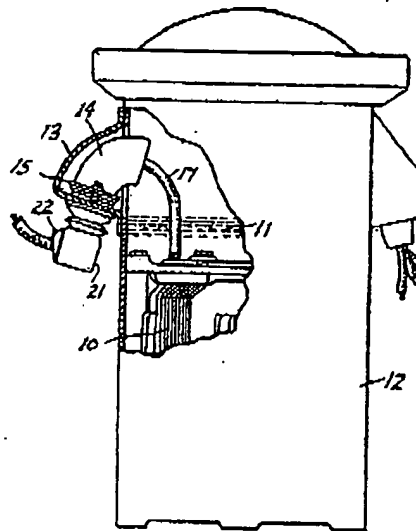


FIG. 2

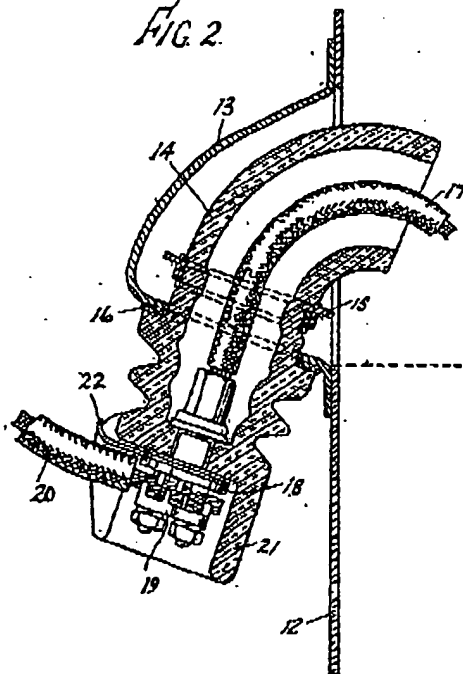


FIG. 3

